

Appl. No. 10/710,761
Reply to Office action of August 09, 2007

REMARKS/ARGUMENTS

Request for Continued Examination:

The applicant respectfully requests continued examination of the
5 above-indicated application as per 37 CFR 1.114.

1. Claim amendments:

Claims 1 and 8 are amended to overcome the claim rejections.
10 Specifically, "scribe line" recited claims 1 and 8 now are replaced with
"cutting area".

According to paragraph [0004] of the specification, the wafer dicing
step/cutting step of the integrated circuit utilizes a cutter to cut the
15 wafer into individual die **along the scribe lines. Inherently and
conceivably, the scribe lines are the cutting areas being contacted
with and cut by the cutter/cutting apparatus.** For example, the cutting
area is the laser beam cutting area when the laser cutting technology is
utilized according to the present application. In order to avoid confusion
20 and clarify limitation recited in claims 1 and 8, the applicant has
replaced "scribe line" with "cutting area". Such amendment is fully
supported by paragraph [0004]-[0021] of the specification and Figs. 2-4
of the present application. No new matter is introduced.

25 *2. Claims 1, 3-8 and 10-16 are rejected under 35 U.S.C. 102(b) as being
anticipated by West et al. (US Patent 6,521,975 B1).*

Response:

30 According to the amended claim 1, a scribe line structure is

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provided. The scribe line structure comprises a substrate, a plurality of dielectric layers formed on the surface of the substrate comprising at least a process monitor pattern set in a cutting area, and a dummy metal structure formed on the surface of the substrate connecting with the process monitor pattern and exposed in the cutting area. Please note that the cutting area refers to area being contacted with and cut by a cutter/cutting apparatus in the cutting or dicing step.

West provides a scribe street seals in semiconductor devices and method of fabrication. According to Fig. 1A of West, a substrate 140 is provided with a plurality of dielectric layer 106 formed thereon. A dicing line 110 referring to an opening produced by the rotating saw separating the individual chips (col. 6, lines 8-10) is between the edges of two chips generally designated 100 and 101 (col. 6, lines 46-48). West also particularly discloses that the sum of these seal regions 104 and 105 plus the dicing line 110 is the distance between adjacent chip data edges 102a and 103a, and represents the "scribe street" 111 between the circuits 102 and 103. (col. 6, lines 55-60).

Please note that the two sets of substantially parallel seal structures provided by West are located within each of said seal regions 104 and 105 as shown I Fig. 1A, whereby the seal structure provides mechanical strength to said sets and simultaneously disperses the energy associated with crack propagation. (abstract)

The applicant would like to point out three differences between the present application and West:

1. The two sets of seal structures comprising continuous barrier wall and sacrificial composite structure are located in the seal regions 104 and

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105, **NOT** in the dicing line 110. Contrary to West, the process monitor pattern and the dummy metal structure of the present application are located in the cutting area on which a cutter is applied during the cutting step.

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2. The seal structures located in the seal region 104 and 105 of West are used to protect the IC from propagating cracks and impurities (col. 6, lines 60-65) originated by rotating saws used in conventional cutting step. Different from West, the scribe line structure of the present application located in the cutting area is used to release heat and energy originated by laser cutting technology from the cutting area and thus to prevent chip cracks due to lateral explosion.

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Additionally, the laser cutting technology is developed to improve propagating chip crack issues originated by rotating saws used in the conventional cutting step, thus such chip crack problem caused by rotating saw as recited in West has been avoided.

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3. Since the seal structure of West is located in the seal regions 104 and 105 for protecting the IC from propagating cracks and impurities, obviously the seal structure will not contact with the cutting apparatus, otherwise its function of reinforcement cannot work. As shown in Fig. 1A of West, the seal structure is to be remained in each individual chips 100 and 101 after the chips 100 and 101 are separated. Contrary to West, the process monitor pattern and the dummy metal structure of the present application, which is located in the cutting area that being contacted with and cut by the cutting apparatus, will be removed in the cutting step.

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In summary, the applicant asserts that the scribe line structure of the

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present application and the seal structure provided by West are different structures located in different areas. Accordingly, West does not teach the scribe line structure as per the limitation disclosed in claim 1 of the present invention. Therefore reconsideration of the amended claim 1 is
5 respectfully requested.

Claims 3-5 are dependent on claim 1 and should be allowed if claim 1 is allowed. Therefore reconsideration of claims 3-5 is politely requested.

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With respect to claim 6, which recites that the process monitor pattern comprises test keys, feature dimension measuring elements, or alignment marks. According to col. 9, lines 63-65 of West, the width of the trenches for the continuous metal structure and the width of the
15 columns for the discontinuous seal structure are typically in the range from 0.2 to 0.4 μm in the earlier layers. West discloses that theses widths may gradually widen in successive layer for easier alignment. Please note that West does not teach or suggest that the continuous metal structure and the discontinuous seal structure can function as
20 alignment marks. Therefore the present application is distinctly different from West, and reconsideration of claim 6 is politely requested.

Claim 7 is dependent on claim 1 and should be allowed if claim 1 is
25 allowed. Therefore reconsideration of claim 7 is politely requested.

With respect to the amended claim 8, which recites a scribe line structure comprising a substrate with its surface comprising at least a cutting area, a plurality of dielectric layers formed on the surface of the
30 substrate comprising at least a process monitor pattern set in the cutting

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area, and a heat irradiative structure formed in the plurality of dielectric layers connecting the plurality of dielectric layers with the surface of the substrate and exposed in the cutting area. The examiner is reminded that the cutting area refers to area being contacted by a
5 cutter/cutting apparatus in the cutting or dicing step.

As mentioned above, West provides a scribe street seals in semiconductor devices and method of fabrication. And the seal structures comprising continuous barrier wall and sacrificial
10 composite structure are located in the seal region 104 and 105, NOT in the dicing line 110 that refers to an opening produced by the rotating saw separating the individual chips (col. 6, lines 8-10), as shown in Fig. 1A.

15 Accordingly there are three differences between the present application and West:

1. The two sets of seal structures of West are located in the seal region 104 and 105 while the heat irradiative structure of the present
20 application is located in the cutting area on which a cutter is applied during the cutting step.

2. The seal structures of West are used to protect the IC from propagating cracks and impurities while the irradiative structure of the
25 present application is used to release heat and energy originated by laser cutting technology from the cutting area and thus to prevent chip cracks due to lateral explosion.

3. Since the seal structure of West is located in the seal regions 104 and
30 105 for protecting the IC from propagating cracks and impurities,

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obviously the seal structure will not contact with the cutting apparatus, otherwise its function of reinforcement cannot work. As shown in Fig. 1A of West, the seal structure is to be remained in each individual chips 100 and 101 after the chips 100 and 101 are separated. Contrary to West, the irradiative structure of the present application, which is located in the cutting area that being contacted with and cut by the cutting apparatus, will be removed in cutting step.

Based on those differences, the applicant asserts that the scribe line structure of the present application and the seal structure provided by West are different structures located in different areas. Thus West does not teach the scribe line structure as per the limitation disclosed in claim 8 of the present invention. Therefore reconsideration of the amended claim 8 is respectfully requested.

Claims 10-14 are dependent on claim 8 and should be allowed if claim 8 is allowed. Therefore reconsideration of claims 10-14 is politely requested.

With respect to claim 15, which recites that the process monitor pattern comprises test keys, feature dimension measuring elements, or alignment marks. As mentioned above, West describes width limitation of the trenches for the continuous metal structure and the width of the columns for the discontinuous seal structure. West also discloses that these widths may gradually widen in successive layer for easier alignment. But West fails to teach or suggest that the continuous metal structure and the discontinuous seal structure can function as alignment marks. Therefore the present application is distinctly different from West, and reconsideration of claim 15 is politely requested.

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Claim 16 is dependent on claim 8 and should be allowed if claim 8 is allowed. Therefore reconsideration of claim 16 is politely requested.

- 5 3. *Claims 2 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over West in view of Chooi et al. (US Patent 6,284,657 B1)*

Response:

- 10 Claims 2 and 9 are respectively dependent on claims 1 and 8, and should be allowed if claims 1 and 8 are allowed. Therefore reconsideration of claims 2 and 9 is politely requested.

4. New claims:

- 15 Claims 17 and 18 are introduced to further limit that the process monitor pattern is set under the cutting area. The added claims are fully supported by the specification and Figs. 3-4 of the present application. And no new matter is entered.

- 20 According to Fig. 1A shown in Page 2 of the detailed action, the seal structure of West comprises a dummy metal structure and a process monitor pattern. However, the process monitor patterns are located in the seal regions 104 and 105 that not contacted with the cutting apparatus during the cutting step. Contrary to West, the process
25 monitor pattern provided by the present application is set under the cutting area therefore will be contacted by the cutting apparatus and removed after the cutting step. Thus the applicant asserts that claims 17 and 18 are patentably different from West. Consideration of claims 17-18 is respectfully requested.

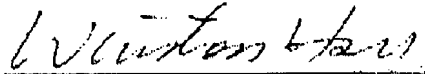
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Applicant respectfully requests that a timely Notice of Allowance
be issued in this case.

Sincerely yours,

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Note: Please leave a message in my voice mail if you need to talk to me. (The time in
D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)

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